

Organization: *National Institute for Research and Development in Microtechnologies (IMT-Bucharest)*

Web Page: *www.imt.ro*

Country: *Romania*

Main Activity: *Research*

Department: *Laboratory of Nanotechnology*

Contact Person: *Marioara Avram*

E-mail: *marioaraa@imt.ro*

Other Contact Data: *+40214908085*

Profile:

- The research activities carried on in Laboratory of Nanotechnology can be divided into four areas which are: Functional nanomaterials, Nanobiosystems, and Microelectromechanical Systems.

The main research direction in Functional nanomaterials area is study of nanostructured silicon based or composite materials, from preparation to surface functionalisation and integration in complex systems.

The Nanobiosystems area focuses on utilizing the various technologies developed in nanofabrication and MEMS to study and solve biological issues. Biomolecular patterns in microarrays, integration of sensing elements onto biochips for study of bioreactions, and implantation of active devices in cells to study cellular biochemistry are examples of research activities being carried out.

The Bio-Microelectromechanical Systems (Bio-MEMS) area focuses on the design, modeling / simulation and fabrication of new complex devices on silicon for applications in many interdisciplinary areas, and recently results in biochips, or microfluidic systems as laboratory-on-a-chip were obtained with applications in biomedicine and environmental monitoring

Participation to European Projects:

- Laboratory of Nanotechnologies was involved in international projects and networks in the area of nanoscience and nanotechnology:

- S-E Europe Regional Network of Excellence Nanosciences and Multifunctional Materials (COSENT) (2002-2005)

- FP6-NoE: Nanostructured and Functional Polymer-Based Materials and Nanocomposites (NANOFUN-POLY) (2004-2008)

- FP6 - RIMDAC programme - Research Infrastructure for Microelectronics Development, Analysis and Characterisation, "Porous silicon matrix for biomedical applications" (2003 – 2004);

- FP5 - Network of Excellence on Nano-electronics (PHANTOMS) (2002-2004)

- Fp5 - EMERGE Programme "Enhancing Microtechnological Education of young Researchers through Guest Experiments", Improving Human Potential Transnational Access To Research Infrastructures, "Metallics - Fabrication of nanoelectrodes" (2000 – 2002);

- Bilateral project Romania – Grecia, "Porous silicon for biological and pharmaceutical applications" (2006-2008);

- Bilateral Project Romania – Italia, "Nanostructured silicon for optical biosensors" (2006-2008);

- Bilateral "Brancusi" Project Romania – Franta, "Selective growth of carbon nanotubes on silicon nanoelectrode array" (2003-2005).

ICT-2007.3.6: Micro/nanosystems

competence / resources

Microelectronics and Magnetic Microsensors

-Development, design, technology and characterization of bipolar and unipolar devices, bipolar and MOS magnetotransistors, Hall sensors, magnetic sensors based on field emission in vacuum;

-New materials and processes;

-Technological development

Microfluidics

new materials and processes, technological development;

proposal / interest

The project goal is to develop a smart microfluidic system for monitoring of clinical relevant parameters, capable of sampling, dispensing and delivering biological fluids to the sensing unit. This goal will be met by applying functionalization of the surfaces to generate controlled hydrophobicity. The device utilizes the surface properties to control and regulate the fluid flow.

The microsystem consists of a series of microchannels with reservoirs and microvalves located in strategic areas, logical microfluidic gates (AND/OR), micropumps, capillary and rotary microviscosimeters, an integrated multiplexer – microdispenser device based on nozzle array, an integrated biosensor array for simultaneous detection of multiple clinically relevant parameters. The biochip output will be inserted into the analyzer unit where the microfluidic sequencing is initiated by a trigger signal from the electronic controller.